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MARINE CIRCULAR 179.3

To: **ALL SHIPOWNERS, MANAGERS, MASTERS, AND REGISTRATION OFFICERS OF MERCHANT SHIPS AND RECOGNIZED ORGANIZATIONS.**

Subject: **SHIP IMPLEMENTATION PLAN FOR THE CONSISTENT IMPLEMENTATION OF THE 0.50% SULPHUR LIMIT UNDER MARPOL ANNEX VI**

1. Reference

1.1 Resolution MEPC.320(74) – *2019 Guidelines for Consistent Implementation of the 0.50% Sulphur limit under MARPOL Annex VI.*

1.2 MEPC.1/Circ.878 – *Guidance on the Development of a ship implementation Plan for the Consistent Implementation of the 0.50% Sulphur Limit under MARPOL Annex VI*

1.3 Resolution MEPC.280(70) *Effective date of implementation of the fuel oil standard in Regulation 14.1.3 of MARPOL Annex VI*

1.4 Marine Circular 145, as amended

2. Purpose

2.1 The purpose of this Marine Circular is to communicate and facilitate the implementation of the 0.50% Sulphur limit under MARPOL Annex VI.

2.2 Following our previous Marine Circular 145, as amended, the Palau Ship Registry Administrator strongly recommends developing implementation plans, outlining how the ships may prepare in order to comply with the required Sulphur content limit of 0.50% by January 1st, 2020. The plan should be complemented with an action plan towards compliance.

3. Applicability

3.1 This Marine Circular applies to all ships registered with the Palau Flag which are 5000 GT and above except for:

3.1.1 Vessels not propelled by mechanical means;
3.1.2 Platforms including Floating Production, storage and Offloading Facilities (FPSOs), Floating Storage Units (FSUs), and Drilling rigs regardless of their propulsion.

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4. Implementation Plan

4.1 The purpose of the implementation plan is to increase awareness of the ship's crew and company on the upcoming compliance with Regulations 14 and 18 of MARPOL Annex VI from January 1st, 2020. Although the ship implementation plan is not mandatory, however, having the implementation plan may prevent vessels from having detailed inspections during Port State Control inspections.

4.2 IMO Circular MEPC.1/Circ.878 on Guidance on the development of a ship implementation plan for the consistent implementation of the 0.50% Sulphur limit under MARPOL Annex VI, addresses safety issues identified with regard to 0.50% maximum Sulphur fuel oil, in particular through the section on risk assessment. Additionally, guidance is provided on impact on machinery systems and tank cleaning. It is recommended that the Implementation Plan is developed based on the indicative example as set out in appendix 1 of the IMO MEPC.1/Circ.878 "Ship Implementation Plan Guidance". The same is attached to this Marine Circular.

4.3 As it is indicated in MEPC.320(74), there are additional information that should be observed when implementing the new Sulphur limit such as type of fuel used, ship tank configuration and fuel system, tank cleaning heating requirements, fuel treatment system, procedures for verification issues and control mechanism and actions, guidance and information sharing on fuel oil non-availability, standard format for reporting fuel oil non-availability and possible safety implications relation to fuel oils meetings the 0.50% m/m Sulphur limit. The same is attached to this Marine Circular.

5. Non-availability of 0.50% Sulphur limit

5.1 For ships which are unable to purchase fuel oil meeting the requirements of regulation 14.1 or 14.4 of MARPOL Annex VI, the standard format for reporting fuel oil non -availability pursuant regulation 18.2.4 of MARPOL Annex VI "Fuel Non-availability Report (FONAR)", is also available annexed to this Marine Circular. The same should be duly filled and sent to the Palau Ship Registry Administrator technical@palaureg.com .

6. Paris MOU and Tokyo MOU Press Release

6.1 On January 20th 2020 Paris MOU and Tokyo MOU jointly published a Press release affirming their position towards the Prohibition on the Carriage of Non-Compliant Fuel and informing that inspections will be undertaken to ensure compliance with the new Sulphur limit requirements on marine fuel oil starting on January 1, 2020.

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6.2 This Marine Circular has been revised in order to be re-circulated with the Press Release attached. Shipowners, Managers, Operators and Recognized Organizations are urged to read the Press Release and work towards its compliance.

7. Contact

7.1 Any inquiries concerning the subject for this Marine Circular should be directed to the Palau Ship Registry Administrator at technical@palaureg.com

****This Marine Circular supersedes Marine Circular 179.2**

Click here or use the below QR Code for the list of the last updated Marine Circular

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Annex I
Palau Ship Registry Administrator
Fuel Oil Non-Availability Report
FONAR

NAME OF VESSEL	IMO NUMBER	CALL SIGN	OFFICIAL NUMBER

Description of ship's voyage plan	
Provide a description of the ship's voyage plan in place at the time of entry into: _____ waters (and ECA, if applicable (attach copy of plan if available)	
Last port of departure	Date of departure from last port (dd-mm-yy)
First port of arrival in	Date of arrival at first port: (dd-mm-yy)
Date the ship first received notice that it would be transiting in _____ waters and (ECA, if applicable)	
Ship's location at the time of noice:	
Date and time the ship operator expects to enter: _____ waters (and ECA if possible)	
Date and time the ship operator expects to exit: _____ waters (and ECA if possible)	
Projected days ship's main propulsion engines will be in operation within _____ waters	
Sulphur content of fuel oil in use when entering and operating in _____ waters	
Evidence of attempts to purchase compliant fuel oil	
Provide a description of actions taken to attempt to achieve compliance prior to entering _____ waters (and ECA if applicable), including a description of all attempts that were made to locate alternative sources of compliant fuel oil, and a description of the reason why compliant fuel oil was not available (Please attached any copies of the description as available)	
Name and address of the suppliers contacted, address and phone number and date of contact: 1 2 3 4 5 Please attached copy of communication with suppliers or additional information if necessary.	

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In case of fuel oil supply disruption only	
Name of port at which ship was scheduled to received compliant fuel oil: Name, email address, and phone number of the fuel oil supplier that was scheduled to deliver (and now reporting the non-availability)	
Master / Company Information	
Local agent at port of noncompliance:	Email address / Address / Contact Information
Ship Operator name:	Email address / Address / Contact Information
Master Name	Master Signature
Date	Ship Stamp

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Annex II
Guidance for Palau registered vessels on proving MARPOL Annex VI global fuel Sulphur cap compliance

Port State Control Inspection will begin, from January 1st, 2020 to inspect vessel to prove compliance with MARPOL Annex VI Global Fuel Sulphur Cap compliance. In view of this upcoming inspections, the Palau Ship Registry Administrator is providing the below questionnaire / checklist to further assist in its compliance.

If a Palau registered vessel fails to prove compliance based on the questionnaire / checklist below, the Palau Ship Registry Administrator must be contacted immediately in order to inform of the status of the compliance and actions taken for its compliance.

NAME OF VESSEL	IMO NUMBER	CALL SIGN	OFFICIAL NUMBER

Initial Inspection: The first stage of the inspection is likely to be a review of the vessel's documentation that relate to fuel Sulphur compliance	
Ship's certificates relating to MARPOL Annex VI (e.g. IAPPC + supplement, EIAPPC)	☐Yes ☐No ☐N/A
Bunker delivery notes (BDN) retained as required	☐Yes ☐No ☐N/A
Bunker operation checklists	☐Yes ☐No ☐N/A
Oil Record Book(s) – Part 1	☐Yes ☐No ☐N/A
Bunker certificates of quality	☐Yes ☐No ☐N/A
Ship implementation plan	☐Yes ☐No ☐N/A
If using different fuels for compliance (e.g. 0.50%S max and 0.10%S max):	
Written fuel changeover procedures in a working language	☐Yes ☐No ☐N/A
Records of fuel changeover when entering and exiting emission control areas (ECAs)	☐Yes ☐No ☐N/A
If non-compliant fuel is on board or the fuel is suspected to be non-compliant:	
Any notification to Palau Flag Administration, the destination port State and the authorities of the country of where bunkers were delivered	☐Yes ☐No ☐N/A
Any letters of protest issued by the vessel and other commercial documentation relevant to noncompliant bunker delivery	☐Yes ☐No ☐N/A
Any FONAR submissions with supporting evidence	☐Yes ☐No ☐N/A
If vessel is fitted with exhaust gas cleaning systems (EGCS):	

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Certificates to show EGCS is an approved "equivalent means" of compliance	☐Yes ☐No ☐N/A
BDN of high sulphur bunkers indicates that it is to be used on unit with EGCS	☐Yes ☐No ☐N/A
Evidence that the EGCS is operational and is being used	☐Yes ☐No ☐N/A
Any notifications to Palau Flag and destination port State of EGCS malfunctions	☐Yes ☐No ☐N/A
If there has been any malfunction to the monitoring instrumentation, provide alternative documentation to prove compliant operation	☐Yes ☐No ☐N/A
More Detailed Inspection: If the initial inspection gives clear grounds for Port State Control to believe that the vessel is not compliance, the PSC will proceed with a more detailed inspection that can include:	
Fuel Sampling: This may include:	
MARPOL delivered sample (drawn at time of bunkering and retained by the vessel)	
The not-in-use onboard sample (drawn from the vessel's bunker storage tanks during inspection)	
The in-use sample (drawn as close as possible to the engine inlet during inspection)	
If PSC request to draw a sample of the fuel in use, the following is to be considered:	
Does the proposed sampling point allow for a sample to be drawn safely?	☐Yes ☐No ☐N/A
Does the proposed sampling point allow for a representative sample to be taken?	☐Yes ☐No ☐N/A
Does the chief engineer and PSCO agree on the sampling point?	☐Yes ☐No ☐N/A
Are samples drawn into clean suitable bottles and sealed with identification tags?	☐Yes ☐No ☐N/A
Documentation: The following may be reviewed or verified by the PSC to confirm compliance	
Do the fuel consumption logs accurately reflect the current remains on board and record the fuel used when in and outside ECA?	☐Yes ☐No ☐N/A
Is there enough compliant fuel on board to reach the next destination?	☐Yes ☐No ☐N/A
Are the crew familiar with the onboard operational procedures and record-keeping requirements relating to bunkers?	☐Yes ☐No ☐N/A
If vessel is fitted with exhaust gas cleaning systems (EGCS):	
Has the EGCS and its monitoring systems been installed and operated in accordance with the manufacturer's instruction?	☐Yes ☐No ☐N/A
Are the monitoring systems fully operational, tamper-proof and allow continuous monitoring?	☐Yes ☐No ☐N/A
Can the vessel evidence compliance with the parameters listed in the system documentation?	☐Yes ☐No ☐N/A
Are the crew familiar with correct operation of the EGCS and the record-keeping requirements?	☐Yes ☐No ☐N/A

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MEPC.1/Circ.878
9 November 2018

GUIDANCE ON THE DEVELOPMENT OF A SHIP IMPLEMENTATION PLAN FOR THE CONSISTENT IMPLEMENTATION OF THE 0.50% SULPHUR LIMIT UNDER MARPOL ANNEX VI

1 The Marine Environment Protection Committee, at its seventy-third session (22 to 26 October 2018), approved the *Guidance on the development of a ship implementation plan for the consistent implementation of the 0.50% Sulphur limit under MARPOL Annex VI*, as set out in the annex.

2 Member Governments are invited to bring the annexed Guidance to the attention of their Administration, industry, relevant shipping organizations, shipping companies and other stakeholders concerned.

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ANNEX

GUIDANCE ON THE DEVELOPMENT OF A SHIP IMPLEMENTATION PLAN FOR THE CONSISTENT IMPLEMENTATION OF THE 0.50% SULPHUR LIMIT UNDER MARPOL ANNEX VI

Introduction

1 MEPC 70 agreed to "1 January 2020" as the effective date of implementation for ships to comply with global 0.50% m/m Sulphur content of fuel oil requirement and adopted resolution MEPC.280(70) on the *Effective date of implementation of the fuel oil standard in regulation 14.1.3 of MARPOL Annex VI*[1].

2 In this context, MEPC 73 agreed that Administrations should encourage ships flying their flag to develop implementation plans, outlining how the ship may prepare in order to comply with the required Sulphur content limit of 0.50% by 1 January 2020. The plan could be complemented with a record of actions taken by the ship in order to be compliant by the applicable date.

3 Regulation 18.2.3 of MARPOL Annex VI requires a Party to take into account all relevant circumstances and the evidence presented to determine the action to take, including not taking control measures. Administrations and port State control authorities may take into account the implementation plan when verifying compliance with the 0.50% sulphur limit requirement.

4 A ship implementation plan is not a mandatory requirement. A lack of a ship implementation plan or an incomplete ship implementation plan should not be considered as "clear grounds" for a more detailed inspection.

Ship implementation plan for the consistent implementation of 0.50% sulphur limit under MARPOL Annex VI

5 The ship implementation plan for 2020 could cover various items relevant for the specific ship, including, as appropriate, but not limited to:

.1 risk assessment and mitigation plan (impact of new fuels);

.2 fuel oil system modifications and tank cleaning (if needed);

.3 fuel oil capacity and segregation capability;

.4 procurement of compliant fuel;

.5 fuel oil changeover plan (conventional residual fuel oils to 0.50% Sulphur compliant fuel oil); and

.6 documentation and reporting.

Issues relating to use of Sulphur compliant fuel oil

6 All fuel oil supplied to a ship shall comply with regulation 18.3 of MARPOL Annex VI and chapter II/2 of SOLAS. Furthermore, ship operators could consider ordering fuel oil specified in accordance with the ISO 8217 marine fuel standard. The following potential fuel-related issues may need to be assessed and addressed by ships in preparation for and implementation of the 0.50% Sulphur limit requirement:

[1] Amendments to regulation 14.1.3 of MARPOL Annex VI were adopted by MEPC 73 (October 2018).

.1 technical capability of ships to handle different types of fuel (e.g. suitability of fuel pumps to handle both higher and lower viscosity fuels, restrictions on fuels suitable for use in a ship's boilers, particularly the use of distillate fuels in large marine boilers);

.2 compatibility of different types of fuels e.g. when paraffinic and aromatic fuels containing asphaltenes are commingled in bunkering or fuel oil changeover;

.3 handling Sulphur non-compliant fuels in the event of non-availability of Sulphur compliant fuels; and

.4 crew preparedness including possible training with changeover procedures during fuel switching from residual fuel oil to 0.50% compliant fuel oils.

7 The ship implementation plan could be used as the appropriate tool to identify any specific safety risks related to Sulphur compliant fuel oil, as may be relevant to the ship, and to develop an appropriate action plan for the Company to address and mitigate the concerns identified. Examples should include:

.1 procedures to segregate different types of fuel and fuels from different sources;

.2 detailed procedures for compatibility testing and segregating fuels from different sources until compatibility can be confirmed;

.3 procedures to changeover from one type of fuel to another or a fuel oil that is known to be incompatible with another fuel oil;

.4 plans to address any mechanical constraints with respect to handling specific fuels, including ensuring that minimum/maximum characteristics of fuel oil as identified in ISO 8217 can be safely handled on board the ship; and

.5 procedures to verify machinery performance on fuel oil with characteristics with which the ship does not have prior experience.

8 A ship implementation plan for the consistent implementation of the 0.50% Sulphur limit under MARPOL Annex VI is recommended to be developed based on the indicative example as set out in appendix 1.

9 The plan could take into account the issues identified in:

.1 appendix 2: additional guidance on development of ship implementation plan (impact on machinery systems); and

.2 appendix 3: additional guidance on development of ship implementation plan (tank cleaning).

APPENDIX 1

INDICATIVE EXAMPLE FOR SHIP IMPLEMENTATION PLAN FOR ACHIEVING COMPLIANCE WITH THE 0.50% SULPHUR LIMIT ENTERING INTO FORCE ON 1 JANUARY 2020 USING COMPLIANT FUEL OIL ONLY

Particulars of ship

1. Name of ship:
2. Distinctive number or letters:
3. IMO Number:

1 Planning and preparation (before 1 January 2020)

1 Risk assessment and mitigation plan

1.1 Risk assessment (impact of new fuels): YES/NO
1.2 Linked to onboard SMS YES/NO

2 Fuel oil system modifications and tank cleaning (if needed)

2.1 Schedule for meeting with manufacturers and/or classification societies:

2.2 Structural Modifications (installation of fuel oil systems/tankage) required:
YES/NO/NOT APPLICABLE

If YES, then:

2.2.1 Fuel oil storage system:

Description of modification:

Details of yard booking (as applicable), time schedules etc.:

Estimated date of completion of modification:

2.2.2 Fuel transfer, filtration and delivery systems:

Description of modification:

Details of yard booking (as applicable), time schedules etc.:

Estimated date of completion of modification:

2.2.3 Combustion equipment:

Description of modification:

Details of yard booking (as applicable), time schedules etc.:

Estimated date of completion of modification:

2.3 Tank cleaning required: YES/NO/NOT APPLICABLE

If YES, then:

Details of cleaning schedule (including, yard booking, time schedules etc., if applicable):

Estimated date of completion of cleaning:

3 Fuel oil capacity and segregation capability:

Following any required modifications as per Section 2:

3.1 Expected number of bunker tanks designated to store 0.50% Sulphur

compliant fuel oil:

3.2 Expected total storage capacity (m^3) for 0.50% Sulphur compliant fuel oil:

3.3 Expected number of bunker tanks designated to store 0.10% Sulphur compliant fuel oil:

3.4 Expected total storage capacity (m^3) for 0.10% Sulphur compliant fuel oil:

3.5 Approximate total fuel oil content (m^3) in the fuel oil transfer, purification and delivery systems:

4 Procurement of compliant fuel oil

4.1 Details of fuel purchasing procedure to source compliant fuels, including procedures in cases where compliant fuel oil is not readily available:

4.2 Estimated date for bunkering compliant fuel oil, not later than 24:00hrs 31 December 2019:

4.3 If fuel arranged by charterer, is there an intention to accept charter party contracts that do not have a specified obligation to provide compliant fuel oil after 1 June 2019 or other date to be identified: YES/NO

If YES, then:

Details of alternate steps taken to ensure that the charter party provides timely delivery of compliant fuel:

4.4 Is there confirmation from bunker supplier(s) to provide compliant fuel oil on the specified date: YES/NO

If NO, then:

Details of alternate steps taken to ensure timely availability of compliant fuel oil:

4.5 Details of arrangements (if any planned) to dispose of any remaining non-compliant fuel oil:

5 Fuel oil changeover plan

5.1 Consider whether a ship-specific fuel changeover plan is to be made available. The plan should include measures to offload or consume any remaining non-compliant fuel oil. The plan should also demonstrate how the ship intends to ensure that all its combustion units will be using compliant fuel oil no later than 1 January 2020.

5.2 As per the ship-specific fuel changeover plan, the maximum time period required to changeover the ship's fuel oil system to use compliant fuel oil at all combustion units:

5.3 Expected date and approximate time of completion of the above-mentioned changeover procedure:

5.4 Consider availability of adequately trained officers and crew familiar with the ship's fuel system and fuel changeover procedures to carry out the fuel oil changeover procedure. If this cannot be confirmed, then consider whether there is a sufficient amount of time dedicated for ship-specific familiarization and training of new officers and crew.

6 Documentation and reporting

6.1 If there are modifications planned as per section 2, related documents including the shipboard fuel oil tank management plans and stability and trim booklets should be consequently updated.

6.2 The implementation plan could be kept on board and updated as applicable.

6.3 If when following the implementation plan the ship has to bunker and use non-compliant fuel oil due to unavailability of compliant fuel oil safe for use on board the ship, steps to limit the impact of using non-compliant fuel oil could be:

6.4 The ship should have a procedure for Fuel Oil Non-Availability Reporting (FONAR). The master and chief engineer should be conversant about when and how FONAR should be used and who it should be reported to.

APPENDIX 2

ADDITIONAL GUIDANCE FOR DEVELOPMENT OF THE SHIP IMPLEMENTATION PLAN (IMPACT ON MACHINERY SYSTEMS)

1 Ships are advised to assess potential impact on machinery systems with the use of distillates and fuel oil blends and prepare ships in consultation with chief engineers, equipment manufacturers and suppliers.

2 The ship tank configuration and fuel system may require adjustments. A fully segregated fuel system for distillate fuels and blended fuels is recommended because they may require special attention. Ship tank configuration and segregated fuel system will also allow for better management of potentially incompatible fuels.

Distillates

3 If distillates have been chosen as the option for compliance the following may be considered:

.1 a decrease in fuel oil viscosity may cause an increase in fuel oil leakage between the fuel pump plunger and barrel of diesel engines. Internal leakages in the fuel injection system may result in reduced fuel pressure to the engine, which may have consequences for the engine performance (e.g. starting of the engine). Equipment makers' recommendations should be consulted, and adequate testing, maintenance and possible installation of coolers etc. may be performed;

.2 shipowners may also consider installing fuel pumps and injection nozzles, suitable to fuel oil with low viscosity. Fuel oil with too low viscosity may lead to increased wear or seizure of fuel oil pumps. Engine and boilermakers should be consulted to ensure its safe and efficient operation. Implications for validity of NO_X certification (EIAPP Certificate) should be considered;

.3 while some compliant fuels may not require heating, others, including some distillates, will require heating. It would therefore be prudent to review heating arrangements for distillate fuels on board and, where appropriate, maintain the existing heating arrangements; and

.4 in some locations, bunker suppliers may only be able to offer automotive diesel fuel containing biodiesel (FAME) in accordance with the ISO 8217-2017 Standard which provides a marine biodiesel specification (DFA/DFB) with up to 7.0% by volume of FAME. CIMAC has provided a "Guideline for Ship Owners and Operators on Managing Distillate Fuels up to 7.0 % v/v Fame (Biodiesel)".[2]

4 In view of paragraph 3.3 manufacturers of engines and equipment such as oily water separators, overboard discharge monitors, filters and coalesces, etc. need to be consulted to confirm ability to handle biodiesel blends up to 7% v/v.

5 Also, some parts of the fuel oil supply system, i.e. fuel pumps, pipefittings and gaskets may need to be overhauled to ensure integrity.

Blended residual fuels

[2] https://www.cimac.com/cms/upload/workinggroups/WG7/CIMAC_WG7_Guideline_for_Ship_Owners_and_Operators_on_Managing_Distillate_Fuels_May_2013.pdf

6 New blended 0.50% Sulphur fuel oil as and when offered could provide an alternative to conventional distillate fuel such as Marine Distillate Fuel.

7 When using such new blended Sulphur fuel oils, the technical specification of such fuels are (a) either within the limits specified by ISO 8217 or are (b) issued with formal documentation indicating no objection to its use by the engine/boiler makers.

8 Before purchasing a new fuel oil product, operators should carefully consider the specific technical and operational challenges that this type of fuel oil may have and, where necessary, contact the fuel oil supplier or Original Equipment Manufacturer (OEM) for the considerations to be made to ensure safe operation.

9 Densities of these fuel oils are in general lower than conventional residual fuel oils. This may require adjustment of centrifuges to ensure adequate cleaning of the fuel oil.

Cold flow

10 Since most distillate fuels do not require heating (in fact, typically, heating is not recommended due to the low viscosity of these products), the fuel's cold flow properties become a potential handling/storage challenge, especially when operating in colder regions.

11 It is however possible to successfully manage cold flow properties through good fuel management, from procurement to technical operation, by considering the following:

.1 where the ship will be operating;

.2 where the risk is higher of getting fuels with poor cold flow properties;

.3 can the required cold flow properties be specified in the fuel contract;

.4 what is the actual low-temperature flow properties of the bunkered fuel; and

.5 which actions have to be taken in order to safely consume the bunkered fuel (e.g. tank and filter heating).

APPENDIX 3

ADDITIONAL GUIDANCE FOR DEVELOPMENT OF THE SHIP IMPLEMENTATION PLAN (TANK CLEANING)

Introduction

1 Most ships will have been using high viscosity high Sulphur fuel oil (HSFO) based primarily on residual fuel oils. Such fuels tend to adhere to the inside of fuel tanks forming layers of semi-solid substances containing sediments and asphaltenic sludge; such residues will also typically have solidified and settled in various parts of the fuel oil service system including pipelines, settling and service tanks.

2 The ship operator may choose to clean the fuel oil tanks of these residues before loading compliant fuel prior to 1 January 2020 based on the following considerations.

3 Some of the fuels complying with the 0.50% Sulphur limit are expected to be very paraffinic due to crude sources of blending components and also a high content of distillate components. If such fuels are loaded into HSFO fuel tanks that have not been cleaned, there is a possibility that they could dissolve and dislodge sediments and asphaltenic sludge in storage tanks, settling tanks and pipelines, potentially leading to purifier and filter operational issues and in extreme cases fuel starvation resulting in loss of power.

4 Alternatively, ships have been using ship specific changeover procedures to effectively and safely load on top of existing fuel oil and gradually flushing through the fuel system until the Sulphur content in the fuel oil is at a compliant level.

5 Should the ship operator determine it is appropriate to clean the ship's fuel oil tanks and system, the following considerations may need to be taken into account when making arrangements for tank cleaning.

Options for tank cleaning, approximate timelines and considerations

6 Fuel oil tanks are normally cleaned on a regular basis on ships to remove built-up sediments and sludge, usually during dry docking and whenever inspections of the fuel tanks are due. However, leading up to 1 January 2020, it would not be practicable for the majority of the global fleet that has been running on HSFO and decided to opt for tank cleaning to undergo dry docking during a very short period. Hence, other options for cleaning tanks and fuel oil systems during service may need to be considered.

7 The time and work involved in cleaning HSFO tanks cannot be defined precisely, as it will vary depending on how long it has been since the last time the tanks were cleaned, the condition of the tank coating and the effectiveness of the cleaning process itself. The estimates in this document may err on the side of caution as it is almost impossible to pinpoint at what stage the ship's fuel oil system is sufficiently clean to guarantee compliance.

Manual cleaning during dry docking

8 Time required varies; it can be done in 2 to 4 days per tank. In addition to cleaning tanks, all of the pipework in the fuel oil service system needs to be flushed through. Overall, it may take 1 to 2 weeks.

9 A ship that has had all its fuel oil tanks and fuel system cleaned can start loading compliant fuels and expect to be fully compliant right away.
10 However, if only the tanks have been cleaned in dry dock, it could take 2 to 5 days to flush through the pipework in the fuel oil service system to ensure full compliance with the 0.50% sulphur limit.

Manual cleaning during service

11 If tanks are to be cleaned manually during service, risk assessment and safety measures are paramount; refer to IMO resolution A.1050(27) on *Revised recommendations for entering enclosed spaces aboard ships*.

12 Time required will vary depending on tank size and the number of tanks, how long it has been since the last tank cleaning and the number of crew available to perform safe and complete tank cleaning operations. Tank cleaning can be performed by the ship's crew and/or by employing a riding crew for this purpose. It is always good practice to inspect the tank once cleaned to check its condition and to inspect heating coils, conduct pressure tests and undertake repairs as necessary.

13 If the cleaning is done by the ship's existing crew, it would likely take a minimum of 4 days per tank. For an average tank, a week should be allowed. If employing a riding crew to clean the tanks, if working in shifts, it would likely take a minimum of 2 days to clean a tank, but 4 days per tank should be allowed.

14 Tanks need to be empty before they can be cleaned, hence the time needed to drain tanks needs to be taken into account when estimating the overall time required.

15 In addition to cleaning tanks, all of the pipework in the fuel oil service system needs to be flushed. Flushing the remaining pipework and fuel oil service system after all tanks have been cleaned could take another 1 to 2 days.

16 The residues from tank cleaning should be retained on board until they can be disposed of correctly or disposed to shore reception facilities.

Cleaning tanks in service with specialized additives

17 As an alternative to manual cleaning, consideration can be given to gradually cleaning the sediments and asphaltenic sludge from HSFO tanks and fuel systems by dosing additives. There are successful examples of this approach for ships that needed to reallocate HSFO tanks to fuels complying with the 0.10% Sulphur limit that took effect in ECAs in 2015.

RESOLUTION MEPC.320(74)

2019 GUIDELINES FOR CONSISTENT IMPLEMENTATION OF THE 0.50% SULPHUR LIMIT UNDER MARPOL ANNEX VI

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution from ships,

RECALLING ALSO that, at its fifty-eighth session, the Committee adopted, by resolution MEPC.176(58), a revised MARPOL Annex VI which significantly strengthens the emission limits for Sulphur oxides (SO_X),

RECALLING FURTHER that, at its seventieth session, the Committee adopted, resolution MEPC.280(70), *Effective date of implementation of the fuel oil standard in regulation 14.1.3 of MARPOL Annex VI*, confirming "1 January 2020" as the effective date of implementation for ships to comply with global 0.50% m/m Sulphur content of fuel oil requirement,

NOTING ALSO that, at its seventy-third session, the Committee approved circular MEPC.1/Circ.878 on the *Guidance on the development of a ship implementation plan for the consistent implementation of the 0.50% Sulphur limit under MARPOL Annex VI*,

HAVING CONSIDERED, at its seventy-fourth session, draft 2019 Guidelines for consistent implementation of the 0.50% Sulphur limit under MARPOL Annex VI, prepared by the Sub-Committee on Pollution Prevention and Response, at its sixth session,

1. ADOPTS the *2019 Guidelines for consistent implementation of the 0.50% **Sulphur** limit under MARPOL Annex VI*, as set out in the annex to the present resolution;
2. REQUESTS Parties to MARPOL Annex VI and other Member Governments to bring these Guidelines to the attention of shipowners, ship operators, fuel oil suppliers and any other interested groups;
3. AGREES to keep these Guidelines under review in the light of experience gained with their application.

ANNEX

2019 GUIDELINES FOR CONSISTENT IMPLEMENTATION OF THE 0.50% SULPHUR LIMIT UNDER MARPOL ANNEX VI

1 Introduction

1.1 Objective

1.1.1 The purpose of these Guidelines is to ensure consistent implementation of the 0.50% Sulphur limit under MARPOL Annex VI. These Guidelines are intended for use by

Administrations, port States, shipowners, shipbuilders and fuel oil suppliers, as appropriate.

1.2 Definitions

1.2.1 For the purpose of these Guidelines, the definitions in MARPOL Annex VI apply.

1.2.2 The following definitions of fuel oils are used, as applicable:

1 Distillate marine fuels (DM) are as specified in ISO 8217:2017[3] (e.g. DMA, DMB, DMX, DMZ);

2 Residual marine fuels (RM) are as specified in ISO 8217:2017[1] (e.g. RMD 80, RMG 380);

3 Ultra-low Sulphur fuel oil (ULSFO) are as specified in ISO 8217:2017[1] (e.g. maximum 0.10% S ULSFO-DM, maximum 0.10% S ULSFO-RM);

4 Very low Sulphur fuel oil (VLSFO) (e.g. maximum 0.50% S VLSFO-DM, maximum 0.50% S VLSFO-RM); and

5 High Sulphur heavy fuel oil (HSHFO) exceeding 0.50% S.

2 Ship implementations planning for 2020

2.1 MEPC 70 agreed to "1 January 2020" as the effective date of implementation for ships to comply with the 0.50% m/m fuel oil Sulphur content limit requirement and adopted resolution MEPC.280(70) on the *Effective date of implementation of the fuel oil standard in regulation 14.1.3 of MARPOL Annex VI*[4].

2.2 In this context, MEPC 73 agreed that Administrations should encourage ships flying their flag to develop implementation plans, outlining how the ship may prepare in order to comply with the required Sulphur content limit of 0.50% by 1 January 2020. The plan should be complemented with a record of actions taken by the ships in order to be compliant by the applicable date.

2.3 MEPC 73, recognizing the need for guidance to support the consistent implementation of the 0.50% Sulphur limit under MARPOL Annex VI, approved MEPC.1/Circ.878 on the *Guidance on the development of a ship implementation plan for the consistent implementation of the 0.50% Sulphur limit under MARPOL Annex VI*.

[3] The latest edition of the ISO standard is recommended.

[4] Regulation 14.1.3 of MARPOL Annex VI, was amended by resolution MEPC.305(73).

3 Impact on fuel and machinery systems

3.0.1 The experiences and lessons learned from the transition to the 0.10% m/m SO_X-ECA limit indicated that current ship machinery operations should be sufficiently capable of addressing the concerns regarding combustion of the new 0.50% m/m limit fuel oils

3.0.2 Currently most of the marine diesel engines and boilers on ships operating outside Emission Control Areas (ECAs) are optimized to operate on heavy fuel oil. From 2020 ships are required to use fuel oils with a Sulphur content of 0.50% m/m or lower, unless fitted with an approved equivalent means of compliance.

3.1 Distillate fuels

3.1.1 A major challenge with distillate fuels is low viscosity. Low viscosity may cause internal leakages in diesel engines, boilers and pumps. Internal leakages in fuel injection system may result in reduced fuel pressure to the engine, which may have consequences for the engine performance (e.g. starting of the engine). Equipment makers recommendations should be taken into account, and adequate testing, maintenance and possible installation of coolers, etc., may be performed.

3.1.2 Cold Filter Plugging Points (CFPP) and Cloud Points (CP) as well as the Pour Point (PP) for distillate fuels need to be considered in light of the ship's intended operating area and ambient temperatures.

3.1.3 These issues are critical concerns as they can result in the formation and accumulation of wax sediment, which can cause costly and avoidable maintenance. In the worst-case scenario, sediment can cause engine fuel starvation and power loss.

3.1.4 ISO 8217:2017[5] limits the cold flow properties of a fuel through setting a limit on the PP. However, given that wax crystals form at temperatures above the PP, fuels that meet the specification in terms of PP can still be challenging to operations in colder operating regions, as the wax particles can rapidly block filters, potentially plugging them completely. For cold weather, additional cold flow properties, CFPP and CP, should be reported by the supplier when the receiving ship has ordered distillate fuel for cold weather operations, a requirement that is specified in ISO 8217:2017[3].

3.1.5 Since the residual fuels are usually heated and distillate fuels are not heated, particular attention needs to be given to the cold flow properties of distillates. Cold flow property challenges can be managed by heating the fuel. CIMAC has issued "01 2015 CIMAC Guideline Cold flow properties of marine fuel oils"[6].

3.1.6 Fuel temperature should be kept approximately 10°C above the PP in order to avoid any risk of solidification, however this may not reduce the risk of filter blocking in case of high CFPP and CP.

3.1.7 It is good practice to review the possibilities of heating arrangements for distillate fuels on board. This is usually very limited, as it is not standard practice to have heating arrangements in distillate storage, settling or service tanks. Transfer arrangements may be adapted to pass through a residual fuel oil heat exchanger should the need arise.

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[5] The latest edition of the ISO standard is recommended.

[6] https://www.cimac.com/cms/upload/workinggroups/WG7/CIMAC_WG7_2015_01_Guideline_Cold__Flow_Properties_Marine_Fuel_Oils_final.pdf

3.1.8 Knowing the fuel properties before bunkering will assist in taking the necessary precautions where and when necessary. If the ship is heading towards colder climates and the cold flow properties are inferior, the fuel may be:

.1 either used before entering cold regions, or
.2 used with suitable heating arrangement, as mentioned above.

3.1.9 If the approach of applying heat is being followed it should be ensured that the fuel is not overheated resulting in the viscosity dropping below the minimum recommendation of 2 cost at any point in the fuel system, including the engine inlet. In order to reduce this risk, heating should be limited to max 40°C.

3.2 Distillate fuel with FAME content

3.2.1 Increased demand for Distillate fuels may result in more land-based products making their way into the marine supply pool, some of these fuels (e.g. biodiesel) may contain Fatty Acid Methyl Ester (FAME).

3.2.2 There are various technical challenges associated with use of fuel having FAME content, e.g. potential oxidation of biodiesel, its biodegradable nature etc. with adverse implications, limitations in storage life etc. It also needs to be tested for stability.

3.2.3 The ISO 8217:2017[3] standard includes a maximum FAME content of 7.0% by volume for DFA/DFZ/DFB fuel oil grades since some ports may offer automotive diesel fuel as the only fuel available, which contains FAME and could violate the fuel flashpoint requirements addressed in SOLAS chapter II-2. The maximum 7.0% (v/v) has been chosen as this aligns with the concentrations allowed in some of the countries applying environmental regulations.

3.2.4 Manufacturers of engines and equipment like oily water separators, overboard discharge monitors, filters, coalesces etc. need to be consulted to confirm the ability of engines and equipment to handle biodiesel blends of up to B7 (i.e. 7.0% v/v).

3.2.5 It is recommended to avoid using such biodiesel blend fuels for lifeboat engines, emergency generators, fire pumps, etc. where it is stored in isolated individual unit fuel tanks and subjected to conditions for accelerated degradation.

3.2.6 CIMAC has provided a Guideline for Shipowners and Operators on Managing Distillate Fuels up to 7.0% v/v Fame (Biodiesel).[7]

3.3 Residual fuels

3.3.1 Stability and compatibility

3.3.1.1 It is essential to distinguish between "Fuel stability" within a single batch of fuel and "Fuel compatibility" between different fuel batches.

3.3.1.2 Regarding stability: the fuel shall be stable and homogeneous at delivery and it is the responsibility of the fuel oil blenders and suppliers to ensure this.

3.3.1.3 A wide range of blends of refined products will be used to make the new 0.50% Sulphur fuels, and the stability and compatibility of the blends will be an important concern for shipowners/operators. Unstable fuels can separate on their own and

[7] https://www.cimac.com/cms/upload/workinggroups/WG7/CIMAC_WG7_Guideline_for_Ship_Owners_and_Operators_on_Managing_Distillate_Fuels_May_2013.pdf

incompatible ones can do so when mixed in a single bunker tank, forming sludge that can block filters and ultimately cause engine failures.

3.3.1.4 It is recommended that ships have a commingling procedure. The procedure should primarily aim to ensure new bunkers are loaded into empty tanks to the extent possible. In the event that a ship finds itself possibly having to commingle a new bunker with bunkers already on board, then it is important that the ship determines the compatibility between the two said bunkers before comingling.

3.3.1.5 The reference test method shall be the total potential sediment test in accordance with ISO 10307-2:2009.

3.3.2 Catalytic fines (cat fines)

3.3.2.1 Cat fines are a by-product of refining and consist of small particles of metal that are deliberately introduced as catalysts to "crack" the fuel oil. Unless reduced by purification, cat fines will become embedded in engine parts and cause serious and rapid engine damage. Reference should be made to engine manufacturer's guidance with respect to managing cat fines.

3.4 Key technical considerations for shipowners and operators

3.4.1 Ship tank configuration and fuel system – the viscosity of most of these blended residual fuels is such that they cannot be used in distillate fuel-only systems and machinery, as they require heating for cleaning and combustion. A fully segregated fuel system for both distillate fuels and these new fuels is recommended.

3.4.2 Tank cleaning is recommended when using a residual fuel tank for storing these new fuels. This is to prevent sludge that has built up in these tanks from entering the fuel system. Further information on tank cleaning is set out in appendix 3 of MEPC.1/Circ.878 on *Guidance on the development of a ship implementation plan for the consistent implementation of the 0.50% Sulphur limit under MARPOL Annex VI*.

3.4.3 Heating requirements – due to the cold flow properties of most of these new fuels, permanent heating of the fuel may be necessary to minimize the risk of wax formation, also in storage. This is especially important in colder regions.

3.4.4 Fuel treatment system – Some of these new fuels may contain cat fines and/or sediments and therefore need on board cleaning. Separator temperature and settings should be adjusted to the fuels' viscosity and density. Please refer to recommendations from OEM and fuel supplier.

3.4.5 Considering that many of these new fuels have lower viscosities compared to conventional residual fuels, care should be taken to ensure no overheating occurs.

3.5 ISO Standard for residual fuels

3.5.1 The bunker market uses ISO 8217:2017[8] specifications to ensure that the properties of the fuels it delivers conform to a standard that mean they comply with MARPOL Annex VI.

3.5.2 The existing ISO 8217:2017[6] specification for marine fuels takes into consideration the diverse nature of marine fuels and incorporates a number of categories of distillate or residual fuels, even though not all categories may be available in every supply location it covers all marine petroleum fuel oils used today as well as the 0.50% Sulphur fuels of 2020. The General requirements, in the ISO 8217:2017[6] specification for marine fuels and characteristics, included in table 1 and 2 of ISO 8217:2017[6]

[8] The latest edition of the ISO standard is recommended.

identified safety, performance and environmental concerns and further takes into consideration the on board handling requirements, including storage, cleaning and combustion aspects of all fuel oils used today and the anticipated fuel blends of 2020, irrespective of the Sulphur content of the fuel oils.

3.5.3 It is important that any new standards address and do not preclude the use of renewable and alternative non-fossil crude derived products, so long as they comply with the chemical properties specified for these fuel oils.

3.6 Cylinder lubrication

3.6.1 The choice of cylinder lubricating oils will often follow the fuel type in use. So, when changing to VLSFO operation from RM operation the choice of appropriate cylinder lubricating oil should be considered in accordance with the recommendations of the engine manufacturer.

4 Verification issues and control mechanism and actions

4.1 Survey and certification by Administrations

4.1.1 When undertaking a survey in accordance with regulation 5 of MARPOL Annex VI, the Administration should conduct a survey of a ship to verify that the ship complies with the provisions to implement the 0.50% Sulphur limit. In particular, the Administration should check whether the ship carries compliant fuel oils for use, based on the Bunker Delivery Note (BDN) on board, any other document or fuel oil samples as appropriate consistent with the provisions of regulation 18 of MARPOL Annex VI. If carriage of HSHFO for use is identified, the Administration should check whether regulation 3.2, regulation 4 of MARPOL Annex VI are applied to the ship, or if the ship encountered a fuel availability problem and is operating pursuant to regulation 18.2 of MARPOL Annex VI.

4.1.2 When an Administration decides to analyze a fuel oil sample to determine compliance with the Sulphur limits in regulation 14.1 or 14.4, the final analysis should be carried out in accordance with ISO 8754:2003 by a laboratory that is accredited for the purpose of conducting the test in accordance with ISO/IEC 17025 or an equivalent standard. The test results should be in accordance with ISO 8754 reporting protocol, meaning a tested value at or above 0.10% Sulphur should be reported with no more than two decimal places.

4.1.3 According to regulation 11.4 of MARPOL Annex VI, the Administration shall investigate any report of an alleged violation and thereafter promptly inform the Party which made the report, as well as the Organization, of the action taken. When informing the Organization, the MARPOL Annex VI GISIS module should be used.

4.2 Control measures by port States

4.2.1 Port States should take appropriate measures to ensure compliance with the 0.50% of Sulphur limit under MARPOL Annex VI, in line with the regulation 10 of MARPOL Annex VI and the *2019 Guidelines for port State control under MARPOL Annex VI* (resolution MEPC.321(74)) (2019 PSC Guidelines). Specifically, the port State should conduct initial inspections based on documents and other possible materials, including remote sensing and portable devices. Given "clear grounds" to conduct a more detailed inspection, the port State may conduct sample analysis and other detailed inspections to verify compliance to the regulation, as appropriate.

4.2.2 Regulation 18.2.3 of MARPOL Annex VI requires a Party to take into account all relevant circumstances and the evidence presented to determine the action to take, including not taking control measures. Administrations and port State control

authorities may take into account the implementation plan when verifying compliance with the 0.50% Sulphur limit requirement.

4.2.3 Inspections based on documents and other possible targeting measurements

4.2.3.1 During the port State control and other enforcement activities, the port State should investigate whether a ship carries either compliant fuel oils or HSHFOs for use, based on the documents listed in paragraph 2.1.2 of the 2019 PSC Guidelines additionally records required to demonstrate compliance should also then be viewed. Results from remote sensing could be used to trigger inspections and portable devices could be used during the initial inspections, as appropriate. Remote sensing and portable devices are, however, of indicative nature and should not be regarded as the evidence of non-compliance but may be considered clear grounds for expanding the inspection.

4.2.3.2 Port state should determine if regulations 3.2, 4 or 18.2.3 apply together with retained bunker delivery notes and IAPP Certificate when considering the status of any HSHFO being carried for use on board.

4.2.4 Fuel oil sample analysis

4.2.4.1 When the port State identifies clear grounds of suspected non-compliance of a ship based on initial inspections, the port State may require samples of fuel oils to be analyzed. The samples to be analyzed may be either the representative samples provided with BDN in accordance with regulation 18.8.2, MARPOL delivered samples or samples from designated sampling points in accordance with the *2019 Guidelines for on board sampling for the verification of the Sulphur content of the fuel oil used on board ships* (MEPC.1/Circ.864/Rev.1) (in-use fuel oil samples) or other samples obtained by the port State.

4.2.4.2 Where the MARPOL delivered sample is taken from the ship a receipt should be provided to the ship. The outcome of the analysis undertaken with appendix VI of MARPOL Annex VI should be advised to the ship for its records.

4.2.4.3 In detecting suspected non-compliance, the sample analysis should be conducted in a uniform and reliable manner as described in paragraph 4.1.2. The verification procedure for MARPOL delivered samples should be in accordance with appendix VI[9] of MARPOL Annex VI. For other samples taken on board the ship, the in-use and onboard sample, the sample should be deemed to meet the requirements provided the test result from the laboratory does not exceed the specification limit +0.59R (where R is the reproducibility of the test method) and no further testing is necessary.

4.2.4.4 Notwithstanding the above process, all possible efforts should be made to avoid a ship being unduly detained or delayed. In particular, sample analysis of fuel oils should not unduly delay the operation, movement or departure of the ship.

4.2.4.5 If a non-compliance is established, consistent with regulation 18.2.3 the port State may prevent the ship from sailing until the ship takes any suitable measures to achieve compliance which may include de-bunkering all non-compliant fuel oil. In addition, the port State should report the information of the ship using or carrying for use non-compliant fuel oil to the Administration of the ship and inform the Party or non-Party under whose jurisdiction a bunker delivery note was issued of cases of delivery of non-compliant fuel oil, giving all relevant information. Upon receiving

[9] Amendments to MARPOL VI, Appendix VI, *Verification procedures for a MARPOL Annex VI fuel oil sample (regulation 18.8.2 or regulation 14.8)*, expected to be adopted in Spring 2020 and set out in annex 11 to document MEPC 74/18.

the information, the Party detecting the deficiency should report the information to the MARPOL Annex VI GISIS module in accordance with paragraph 3.4 of these Guidelines.

4.2.4.6 The Parties (the port and flag States), however, may permit, with the agreement of the destination port authority, a single voyage for bunkering of compliant fuel oil for the ship, in accordance with regulation 18.2.4 of MARPOL Annex VI. The single voyage should be one way and minimum for bunkering, and the ship proceeds directly to the nearest bunkering facility appropriate to the ship. In the case that the parties permit a single voyage of a ship, the port State should confirm that the Administration of the ship has advised the authority at the destination port of the approval for a single voyage including information on the ship granted with the approval and the certified record of analysis of the sample as the evidence. Once confirmation has been provided the port State should permit the ship to sail as agreed.

4.2.4.7 If the port State is made aware that a ship is carrying non-compliant fuel oil, which is not for use through an equivalent method under regulation 4 or a permit under regulation 3.2 of MARPOL Annex VI, the port State should take action to confirm the fuel is not being used. Action to confirm should include but is not limited to the examination of the oil record book and the record of tank soundings. Where necessary the port State may require tank soundings to be undertaken during the inspection. Where it is determined that the fuel has been used the control action in paragraph 4.2.4.5 should be applied.

4.2.5 Other open-sea compliance monitoring tools:

.1 fuel oil changeover calculator;

.2 data collection system for (resolution MEPC.278(70)); and fuel oil consumption of ships

.3 continuous SO_X monitoring.

4.3 Control on fuel oil suppliers

4.3.1 Designated authorities should, if deemed necessary, take a sample and test fuel oils from bunker barges or shore bunker terminals. Sampling of fuel oils in bunker barges or shore bunker terminals can be taken and tested in the same manner that the MARPOL delivered fuel oils are tested by the PSC. All possible efforts should be made to avoid a ship being unduly detained or delayed. If a sample is analyzed, sample analysis of fuel oils should not unduly delay the operation, movement or departure of the ship.

4.3.2 If non-compliance, such as issuance of an incorrect BDN or a BDN without measurement of Sulphur content, was found, the designated authorities should take appropriate corrective measures against the non-compliant supplier. In such case, the designated authorities should inform the Organization for transmission to the Member States of the non-compliant supplier, in accordance with the regulation 18.9.6 of MARPOL Annex VI and paragraph 4.4 of these Guidelines.

4.4 Information sharing related to non-compliances under MARPOL Annex VI

4.4.1 When a Party finds a non-compliance of a ship or a fuel oil supplier, the information of the non-compliance should be reported to the MARPOL Annex VI GISIS module (regulation 11.4).

4.4.2 Publication of information on non-compliant ships/fuel oil suppliers or a reporting scheme to IMO to be registered on centralized information platforms are proposed as

elements of an effective enforcement strategy. Various PSC regimes have successfully used the publishing of information related to substandard ships/fuel suppliers as a deterrent to non-compliance. Port States also need to report detentions of ships to IMO which may affect the future PSC targeting of the ship. The IMO GISIS database already makes available certain information related to non-compliances with the MARPOL Annex VI regulations.

5 Fuel oil non-availability

5.1 Guidance and information sharing on fuel oil non-availability

5.1.1 Regulation 18.2.1 of MARPOL Annex VI provides that in the event compliant fuel oil cannot be obtained, a Party to MARPOL Annex VI can request evidence outlining the attempts made to obtain the compliant fuel oil, including attempts made to local alternative sources. Regulations 18.2.4 and 18.2.5 then require that the ship notifies its Administration and the competent authority of the port of destination on the inability to obtain compliant fuel oil, with the Party to notify IMO of the non-availability. This notification is commonly referred to as a Fuel Oil Non-Availability Report (FONAR).

5.1.2 Guidance on consistent evidence

5.1.3 Regulation 18.2.1.2 of MARPOL Annex VI requires that evidence be provided to support a claim that all efforts were made to obtain compliant fuel oil. In this regard, a Party may develop more detailed guidance for the consistent use and acceptance of these reports, including what evidence is needed to accompany a report to ensure that port States are applying the provisions under regulation 18.2.3, consistently.

5.1.4 Should a ship, despite its best effort to obtain compliant fuel oil, be unable to do so, the master/company must:

.1 present a record of actions taken to attempt to bunker correct fuel oil and provide evidence of an attempt to purchase compliant fuel oil in accordance with its voyage plan and, if it was not made available where planned, that attempts were made to locate alternative sources for such fuel oil and that despite best efforts to obtain compliant fuel oil, no such fuel oil was made available for purchase; and

.2 best efforts to procure compliant fuel oil include, but are not limited to, investigating alternate sources of fuel oil prior to commencing the voyage. If, despite best efforts, it was not possible to procure compliant fuel oil, the master/Company must immediately notify the port State Administration in the port of arrival and the flag Administration (regulation 18.2.4 of MARPOL Annex VI).

5.1.5 In order to minimize disruption to commerce and avoid delays, the master/company should submit a FONAR as soon as it is determined or becomes aware that it will not be able to procure and use compliant fuel oil.

5.1.6 Investigating non-availability

5.1.7 A Party should investigate the reports of non-availability. This process is important to ensure a consistent supply of compliant fuel to industry, as well as prevent incentives for ships to use ports where it is known that compliant fuel is not available on an ongoing basis. Critical to this process will be the sharing of information between Member States on reported compliant fuel oil supply issues.

5.1.8 Regulation 18.2.5 of MARPOL Annex VI provides that a Party to MARPOL Annex VI notify the Organization when a ship has presented evidence of the non-availability of

compliant fuel oil in a port or at their terminal. For this purpose, MARPOL Annex VI GISIS module provides the platform for Parties to upload such notifications.

5.1.9 Regulation 18.1 of MARPOL Annex VI provides that each Party take all reasonable steps to promote the availability of above compliant fuel oil and inform the Organization through MARPOL Annex VI GISIS module of the availability of compliant fuel oils in its ports and terminals.

5.1.10 Port State control authority may contact the submitter (and/or shipowner or operator), including in the event of an incomplete submission, and request additional information, or to pursue an enforcement action such as a Notice of Violation.

5.2 Standard format for reporting fuel oil non-availability

5.2.1 For ships which are unable to purchase fuel oil meeting the requirements of regulations 14.1 or 14.4 of MARPOL Annex VI, the standard format for reporting fuel oil non-availability is set out in appendix 1 to this document, pursuant to regulation 18.2.4 of MARPOL Annex VI.

6 Possible safety implications relating to fuel oils meeting the 0.50% m/m sulphur limit

6.1 MEPC 73 (October 2018) approved MEPC.1/Circ.878 on *Guidance on the development of a ship implementation plan for the consistent implementation of the 0.50% sulphur limit under MARPOL Annex VI* (hereafter the "Ship Implementation Plan Guidance") addresses some safety issues identified with regard to 0.50% maximum sulphur fuel oil, in particular through the section on risk assessment (section 1 of the Ship Implementation Plan Guidance) and additional guidance provided on impact on machinery systems and tank cleaning (appendix 2 and appendix 3 of the Ship Implementation Plan Guidance, respectively).

6.2 Identified potential safety implications include, but are not limited to, the following:

.1 stability of blended fuel oil;
.2 compatibility, including new tests and metrics appropriate for future fuels;
.3 cold flow properties;
.4 acid number;
.5 flash point;
.6 ignition and combustion quality;
.7 cat fines;
.8 low viscosity; and
.9 unusual components.

6.3 Additional technical information and a review, displayed in tabular format, of the possible potential safety implications is set out in appendix 2.

6.4 Reference should also be made to general industry guidance on potential safety and operational issues related to the supply and use of 0.50% maximum sulphur fuels[10].

[10] ICS, ASA and ECSA Guidance to shipping companies and crews on preparing for compliance with the 2020 global Sulphur limit can be accessed at the following link: http://www.ics-shipping.org/freeresources/2020-sulphur-compliance

APPENDIX 1

FUEL OIL NON-AVAILABILITY REPORT (FONAR)

Note:

1 This report is to be sent to the flag Administration and to the competent authorities in the relevant port(s) of destination in accordance with regulation 18.2.4 of MARPOL Annex VI. The report shall be sent as soon as it is determined that the ship/operator will be unable to procure compliant fuel oil and preferably before the ship leaves the port/terminal where compliant fuel cannot be obtained. A copy of the FONAR should be kept on board for inspection for at least 36 months.

2 This report should be used to provide evidence if a ship is unable to obtain fuel oil compliant with the provisions stipulated in regulations 14.1 or 14.4 of MARPOL Annex VI.

3 Before filing a FONAR, the following should be observed by the ship/operator:

3.1 A fuel oil non-availability report is not an exemption. According to regulation 18.2 of MARPOL Annex VI, it is the responsibility of the Party of the destination port, through its competent authority, to scrutinize the information provided and take action, as appropriate.

3.2 In the case of insufficiently supported and/or repeated claims of non-availability, the Party may require additional documentation and substantiation of fuel oil non-availability claims. The ship/operator may also be subject to more extensive inspections or examinations while in port.

3.3 Ships/operators are expected to take into account logistical conditions and/or terminal/port policies when planning bunkering, including but not limited to having to change berth or anchor within a port or terminal in order to obtain compliant fuel.

3.4 Ships/operators are expected to prepare as far as reasonably practicable to be able to operate on compliant fuel oils. This could include, but is not limited to, fuel oils with different viscosity and different Sulphur content not exceeding regulatory requirements (requiring different lube oils) as well as requiring heating and/or other treatment on board.

1 Particulars of ship

1.1 Name of ship: _____
1.2 IMO number: _____
1.3 Flag: _____
1.4 (if other relevant registration number is available, enter here): _____

2 Description of ship's voyage plan

2.1 Provide a description of the ship's voyage plan in place at the time of entry into "country X" waters (and ECA, if applicable) (Attach copy of plan if available):

_____

_____

_____

2.2 Details of voyage:

1 Last port of departure _____
2 First port of arrival in "country X":_____
3 Date of departure from last port (dd-mm-yyyy):_____
4 Date of arrival at first "country X" (dd-mm-yyyy):_____
5 Date ship first received notice that it would be transiting in "country X" waters (and ECA, if applicable) (dd-mm-yyyy): _____
6 Ship's location at the time of notice: _____
7 Date ship operator expects to enter "country X" waters (and ECA, if applicable) (dd-mm-yyyy):_____
8 Time ship operator expects to enter "country X" waters (and ECA, if applicable) (hh: mm UTC): _____
9 Date ship operator expects to exit "country X" waters (and ECA, if applicable) (dd-mm-yyyy): _____
10 Time ship operator expects to exit "country X" waters (and ECA, if applicable) (hh: mm UTC): _____
11 Projected days ship's main propulsion engines will be in operation within "country X" waters (and ECA, if applicable): _____
12 Sulphur content of fuel oil in use when entering and operating in "country X" waters (and ECA, if applicable): _____

3 Evidence of attempts to purchase compliant fuel oil

3.1 Provide a description of actions taken to attempt to achieve compliance prior to entering "country X" waters (and ECA, if applicable), including a description of all attempts that were made to locate alternative sources of compliant fuel oil, and a description of the reason why compliant fuel oil was not available:

_____
_____
_____

3.2 Name and email address of suppliers contacted, address and phone number and date of contact (dd-mm-yyyy):

_____
_____
_____
_____
_____

Please attach copies of communication with suppliers (e.g. emails to and from suppliers)

4 In case of fuel oil supply disruption only

4.1 Name of port at which ship was scheduled to receive compliant fuel oil:

_____
_____
_____
_____
_____

4.2 Name, email address, and phone number of the fuel oil supplier that was scheduled to deliver (and now reporting the non-availability): _____

5 Operation constraints, if applicable

5.1 If non-compliant fuel has been bunkered due to concerns that the quality of the compliant fuel available would cause operational or safety problems on board the ships, the concerns should be thoroughly documented.

5.2 Describe any operational constraints that prevented use of compliant fuel oil available at port: _____

5.3 Specify steps taken, or to be taken, to resolve these operational constraints that will enable compliant fuel use: _____

6 Plans to obtain compliant fuel oil

6.1 Describe availability of compliant fuel oil at the first port-of-call in "country X", and plans to obtain it:_____

7.2 If compliant fuel oil is not available at the first port-of-call in "country X", list the lowest Sulphur content of available fuel oil(s) or the lowest Sulphur content of available fuel oil at the next port-of-call: _____

7 Previous Fuel Oil Non-Availability Reports

7.1 If shipowner/operator has submitted a Fuel Oil Non-Availability Report to "country X" in the previous 12 months, list the number of Fuel Oil Non-Availability Reports previously submitted and provide details on the dates and ports visited while using non-compliant fuel oil, as set out below:

Report: _____
Date (dd-mm-yyyy): _____
Port: _____
Type of fuel: _____
Comments: _____

8 Master/Company information

Master name: _____
Local agent in "country X": _____
Ship operator name: _____
Shipowner name: _____
Name and position of official: _____ _____
Email address: _____
Address (street, city, country, postal/zip code): _____
Telephone number: _____

Signature of Master: _____

Print name: _____
Date (DD/MM/YYYY): _____

APPENDIX 2

TECHNICAL REVIEW OF IDENTIFIED POTENTIAL SAFETY IMPLICATIONS ASSOCIATED WITH THE USE OF 2020 COMPLIANT FUELS

Fuel Property	Potential Challenges	Remarks
Stability	The consequences of a ship receiving an unstable fuel, or one that becomes unstable during storage or handling, can be serious. Sludge may build up in the storage tanks, piping systems or centrifuges and filters can become totally blocked by voluminous amounts of sludge.	The challenge for the fuel producer is to blend a fuel which is not only stable but also has a degree of reserve stability such that it will remain stable during periods of storage and treatment at elevated temperatures. More paraffinic blend components are expected for Very Low Sulphur Fuel Oil (VLSFO) compared to existing fuels. Whereas aromatic components have a stabilizing effect on asphaltenes, paraffins do not. Fuel suppliers are responsible for ensuring that the supplied fuel is stable.
Compatibility issues	Challenges are the same as with stability (above).	An incompatible mix may be harmful to ship's operation. VLSFOs are expected to be paraffinic based in some regions and aromatic based in other regions. There is a risk of experiencing incompatibility when mixing an aromatic fuel with a paraffinic fuel. The same risk exists today, but with the wide range of products which may exist post 2020, it is important to segregate fuels as far as possible and to be cautious of how to manage/handle incompatible fuels on board.
Cold flow properties and Pour Point	ISO 8217:2017 limits the cold flow properties of a fuel through setting a limit on the pour point (PP). However, given that wax crystals form at temperatures above the PP, fuels that meet the specification in terms of PP can still be challenging when operating in colder regions. Wax particles can rapidly block filters, potentially plugging them completely. The paraffin's may crystallize and/or deposit in the storage tanks leading to blockages at the filters and reduced fuel flow to the machinery plants. If fuels are held at temperatures below the pour point, wax will begin to precipitate. This wax may cause blocking of filters and can deposit on heat exchangers. In severe	VLSFO products are expected to be more paraffinic compared to existing fuels. As such, it is important to know the cold flow properties of the bunkered fuel in order to ensure proper temperature management on board. It is important to note that for additives to be effective, they have to be applied before crystallization has occurred in the fuel. Reference 1.

Fuel Property	Potential Challenges	Remarks
	cases the wax will build up in storage tank bottoms and on heating coils, which can restrict the coils from heating the fuel (fuel will become unpumpable from the bunker tanks).	
Acid number	The fuel shall be free from strong, inorganic acids. Fuels with high acid number test results arising from acidic compounds cause accelerated damage to marine diesel engines. Such damage is found primarily within the fuel injection equipment.	There is currently no recognized correlation between an acid number test result and the corrosive activity of the fuel. ISO 8217:2017, appendix E covers the topic.
Flashpoint	Flashpoint is considered to be a useful indicator of the fire hazard associated with the storage of marine fuels. Even if fuels are stored at temperatures below the determined flash point, flammable vapors may still develop in the tank headspace.	SOLAS requirement.
Ignition and combustion quality	Fuels with poor ignition & combustion properties can, in extreme cases, result in serious operational problems, engine damage and even total breakdown. Poor combustion performance is normally characterized by an extended combustion period and/or poor rates of pressure increase and low "p max" resulting in incomplete combustion of the fuel. The resulting effects are increased levels of unburned fuel and soot that may be deposited in the combustion chamber, on the exhaust valves and in the turbocharger system, exhaust after treatment devices, waste heat recovery units and other exhaust system components. Extended combustion periods may also result in exposure of the cylinder liner to high temperatures which may disrupt the lubricating oil film, leading to increased wear rates and scuffing. Unburnt fuel droplets may also carry over impinging on the liner surfaces causing further risk of damage to the liner.	High and medium-speed engines are more prone to experience operational difficulties due to poor ignition and combustion properties than low speed two stroke types. With four stroke engines, poor ignition can result in excessive exhaust gas system deposits, black smoke, engine knocking and difficulties operating at low load. If the ignition process is delayed for too long a period by virtue of some chemical quality of the fuel, too large a quantity of fuel will be injected into the engine cylinders and will ignite at once, producing a rapid pressure and heat rise and causing associated damage to the piston rings and cylinder liners of the engine. Reference 2.
Fuel Property	**Potential Challenges**	**Remarks**
Cat fines	Cat fines will cause abrasive wear of cylinder liners, piston rings and fuel injection equipment if not reduced sufficiently by the fuel treatment system. High wear in the combustion chamber can result.	Major engine manufacturers recommend that the fuel's cat fines content does not exceed 10 mg/kg (ppm) at engine inlet.

Low viscosity	Viscosity fuels (less than at engine inlet) challenge the function of the fuel pump in following ways: breakdown of the oil film, which could result in seizures; insufficient injection pressure, which results in difficulties during start-up and low-load operation; and insufficient fuel index margin, which limits acceleration.	Low fuel viscosity does not only affect the engine fuel pumps. Most pumps in the external fuel oil system (supply pumps, circulating pumps, transfer pumps and feed pumps for the centrifuge) also need viscosities above 2 cost to function properly. Viscosity is highly temperature dependent and the crew must take proper care of fuel oil temperature management to avoid viscosity related issues. Reference 3.
Unusual components	The below components and group of components can be linked to the risk of encountering the following problems: • Polymers (e.g. polystyrene, polyethylene, polypropylene) Associated with filter blocking • Polymethacrylates Associated with fuel pump sticking • Phenols Occasionally Associated with filter blocking/fuel oil pump sticking • Tall oils Associated with filter blocking • Chlorinated hydrocarbons Associated with fuel pump seizures • Estonian shale oil Associated in the past with excessive separator sludging • Organic acids Associated with corrosion as well as fuel pump sticking	Only for few components, there exists a clear cause and effect between component and associated operational problems. There is no statistical study performed of which components are typically found in marine fuels and in which concentration. As per ISO 8217:2017, annex B: The marine industry continues to build on its understanding of the impact of specific chemical species and the respective critical concentrations at which detrimental effects are observed on the operational characteristics of marine fuels in use. Only in some of the past cases the origin of the unusual components found in bunkers were revealed and were due to various reasons such as: 1Russia/Baltic states 1997, cross contamination in storage/piping (polypropylene); 2 Singapore 2001, 4 bunker barges received material from road
Fuel Property	**Potential Challenges**	**Remarks**
		tankers which, in addition to transporting fuel, also collected/transported waste oil from shipyards and motor shops (esters); 3 Vents pills 2007, Estonian shale oil to convert HSHFOs to LSFOS; and .4 Houston 2010/11, bunker barges that were not cleaned between cargoes (polyacrylates) Reference 4.

References

CIMAC WG7 Fuels Guideline 01/2015: "Cold flow properties of marine fuel oils"

1 CIMAC WG7 Fuels 2011: "Fuel Quality Guide: Ignition and Combustion"

2 MAN Service Letter SL2014-593/DOJA

3 Bureau Veritas Verifuel, Investigative analysis of marine fuel oils: Pros & Cons

PROHIBITION ON THE CARRIAGE OF NON-COMPLIANT FUEL

The Tokyo and Paris Memoranda of Understanding (MoUs) on port State control (PSC) have been working collaboratively to ensure that vessel owners and operators are aware that under the Authorities belonging to these MoUs, inspections will be undertaken to ensure compliance with the new sulphur limit requirements on marine fuel oil, from 1 January 2020.

These new requirements prohibit the use of non-compliant fuel from 1 January 2020 and the carriage of non-compliant fuel, for use on the ship, from 1 March 2020, unless the ship is fitted with an Exhaust Gas Cleaning System (EGCS).

To raise awareness in advance of the implementation of the new requirements, both the Paris MOU and the Tokyo MOU member Authorities have been issuing letters to vessels since the beginning of 2019, to remind them of the new requirements and the date of application.

During this information campaign the awareness among ships' crew proved to be high, especially with respect to the requirements entering into force on 1 January 2020. Emphasis is therefore placed on the requirements entering into force on 1 March 2020 prohibiting the carriage of non-compliant fuel, for use on ships not equipped with EGCSs.

As noted in these letters, there are three options for ship owners and operators to comply:

1. Use compliant fuel oil with sulphur content not more than 0.50% m/m;

2. Use an alternative fuel, such as LNG, with a sulphur content of 0.50 % m/m or less; or

3. Fit an alternative means of compliance, such as an EGCS approved under regulation 4 of MARPOL Annex VI.

The consensus at MEPC 73 was that there was no need to request port State control Authorities to adopt a 'practical and pragmatic' approach as compliance was expected, therefore both Memoranda have agreed that the requirements in relation to the implementation of the 0.50% m/m sulphur cap will be applied without exception. This includes the carriage ban on non-compliant fuel from 1 March 2020.

From 1 March 2020 non-compliant fuel can only be carried on board, for use on the ship, where the vessel is fitted with an EGCS. In instances where compliant fuel cannot be obtained a Fuel Oil Non-Availability Report (FONAR) must be submitted to the flag State and the Competent Authority in the next port of call.

Paris MOU	**Tokyo MOU**
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Notes to editors:

Paris MOU	Tokyo MOU
Regional Port State Control was initiated in 1982 when fourteen European countries agreed to coordinate their port State inspection effort under a voluntary agreement known as the Paris Memorandum of Understanding on Port State Control (Paris MOU). Currently 27 countries are member of the Paris MOU. The European Commission, although not a signatory to the Paris MOU, is also a member of the Committee. The Paris MoU is supported by a central database THETIS hosted and operated by the European Maritime Safety Agency in Lisbon. Inspection results are available for search and daily updating by MoU Members. Inspection results can be consulted on the Paris MoU public website and are published on the Equasis public website. The Secretariat of the MoU is provided by the Netherlands Ministry of Infrastructure and Water Management and located in The Hague.	The Memorandum of Understanding on Port State Control in the Asia-Pacific Region, known as the Tokyo MOU, was signed among eighteen maritime Authorities in the region on 1 December 1993 and came into operation on 1 April 1994. Currently, the Memorandum has 21 full members, namely: Australia, Canada, Chile, China, Fiji, Hong Kong (China), Indonesia, Japan, Republic of Korea, Malaysia, the Marshall Islands, New Zealand, Panama, Papua New Guinea, Peru, the Philippines, the Russian Federation, Singapore, Thailand, Vanuatu and Vietnam. The Secretariat of the Memorandum is located in Tokyo, Japan. The PSC database system, the Asia-Pacific Computerized Information System (APCIS), was established. The APCIS centre is located in Moscow, under the auspices of the Ministry of Transport of the Russian Federation.
Port State Control is a check on visiting foreign ships to verify their compliance with international rules on safety, pollution prevention and seafarers living and working conditions. It is a means of enforcing compliance in cases where the owner and flag State have failed in their responsibility to implement or ensure compliance. The port State can require deficiencies to be corrected, and detain the ship for this purpose if necessary. It is therefore also a port State's defence against visiting substandard shipping.	